

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the applications:

Listing of Claims:

- X Claim 1: An apparatus to perform semiconductor processing, comprising:
107 a process chamber;
110 a plasma generator for generating a plasma in the process chamber; and
112 170 a 3-dimensional helical ribbon electrode coupled to the output of the plasma
generator.

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Claim 2 (original): The apparatus of claim 1, wherein the helical ribbon electrode is external to the process chamber.

Claim 3 (original): The apparatus of claim 2, further comprising a dielectric wall position between the chamber and the helical ribbon electrode.

Claim 4 (original): The apparatus of claim 3, wherein the dielectric wall is a flat plate.

Claim 5 (original): The apparatus of claim 3, wherein the dielectric wall is concave.

Claim 6 (original): The apparatus of claim 3, wherein the dielectric wall is convex.

Claim 7 (original): The apparatus of claim 3, wherein the dielectric wall is a tube.

Claim 8 (original): The apparatus of claim 7, wherein the dielectric wall projects through the center of the helical ribbon electrode.

Fig 1
Claim 9 (original): The apparatus of claim 1, wherein the helical ribbon electrode is internal to the process chamber.

X Claim 10 (original): The apparatus of claim 1, wherein the apparatus is adapted to receive a workpiece in the chamber and wherein the distance between the helical ribbon electrode and the workpiece is less than five inches.

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X Claim 11 (original): The apparatus of claim 1, wherein the apparatus is adapted to receive a workpiece in the chamber and wherein the distance between the helical ribbon electrode and the workpiece is between approximately one inch and approximately three inches.

Claim 12 (original): The apparatus of claim 1, wherein the plasma generator pulses the helical ribbon electrode to perform pulse processing.

Claim 13 (original): The apparatus of claim 1, further comprising a controller coupled to the control input of the plasma generator to control the generation of the plasma.

Claim 14 (original): The apparatus of claim 1, wherein the plasma generator is a radio frequency (RF) plasma generator.

Claim 15 (original): The apparatus of claim 1, wherein the plasma generator is a solid state plasma generator without any moving parts and capable of short tuning response time.

Claim 16 (original): The apparatus of claim 1, wherein the plasma generator is a solid state plasma generator employing frequency tuning to achieve output matching.

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+ Claim 17 (withdrawn): A method to deposit a multi-layer semiconductor, comprising:

- (a) introducing a gas into a processing chamber; and
- (b) generating a pulse with a response time of less than one second; and
- (c) exciting the plasma in accordance with the pulse using a helical ribbon electrode.

+ Claim 18 (withdrawn): The method of claim 17, further comprising purging the chamber.

+ Claim 19 (withdrawn): The method of claim 17, further comprising sequentially pulsing the plasma for each layer to be deposited.

+ Claim 20 (canceled):

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Claim 21 (new): The apparatus of claim 1, wherein the 3-dimensional helical ribbon electrode is a 3-dimensional cylindrical helix that forms a plurality of spiral turns in different planes.

Claim 22 (new): The apparatus of claim 21, wherein the spiral turns are essentially similar in size.

Claim 23 (new): The apparatus of claim 1, wherein the 3-dimensional helical ribbon electrode has an elongated cross section.

X Claim 24 (new): A multi-layer processing chamber, comprising:

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a gas source coupled to the chamber for introducing a processing gas into a reaction chamber having a sample disposed therein;
a solid state RF plasma source coupled to the chamber to excite the processing gas;
a 3-dimensional helical ribbon electrode adapted to excite the plasma, the helical ribbon electrode having an elongated cross section; and
a controller coupled to the solid state RF plasma source to pulse the solid state RF plasma source for each deposited layer.
